

Dual P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
- 30	0.021 at $V_{GS} = - 10$ V	- 10 ^a	26 nC
	0.031 at $V_{GS} = - 4.5$ V	- 10 ^a	

FEATURES

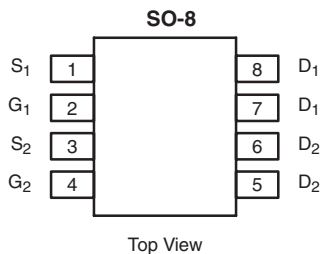
- TrenchFET[®] Power MOSFET
- ESD Protection: 2500 V



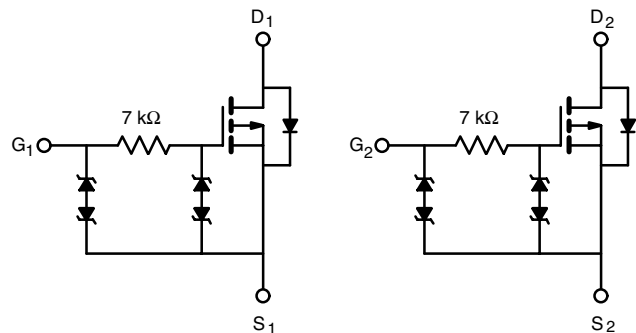
RoHS
COMPLIANT

APPLICATIONS

- Load Switch for Portable Devices
- Battery and Load Switching for Notebooks



Ordering Information: Si4941EDY-T1-E3 (Lead (Pb)-free)



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	- 30	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	- 10 ^a	A
		$T_C = 70$ °C	- 8.8	
		$T_A = 25$ °C	- 8.3 ^{b, c}	
		$T_A = 70$ °C	- 6.6 ^{b, c}	
Pulsed Drain Current	I_{DM}	- 30		
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	- 3	
		$T_A = 25$ °C	- 1.7 ^{b, c}	
Maximum Power Dissipation	P_D	$T_C = 25$ °C	3.6	W
		$T_C = 70$ °C	2.3	
		$T_A = 25$ °C	2 ^{b, c}	
		$T_A = 70$ °C	1.3 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, c}	R_{thJA}	45	62.5	°C/W
Maximum Junction-to-Foot (Drain)	R_{thJF}	26	35	

Notes:

- Package limited.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under Steady State conditions is 110 °C/W



SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-33		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.2		-2.8	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 20	μA
		$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 1	mA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$	-30			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -8.3\text{ A}$		0.017	0.021	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -6.8\text{ A}$		0.025	0.031	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -8.3\text{ A}$		26		S
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -8.3\text{ A}$		46	70	nC
				26	39	
				6.7		
Gate-Source Charge	Q_{gs}	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -8.3\text{ A}$		14		
Gate-Drain Charge	Q_{gd}			14		
Gate Resistance	R_g	$f = 1\text{ MHz}$		7.3		k Ω
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 2.3\text{ }\Omega$ $I_D \cong -6.6\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		16	24	μs
Rise Time	t_r			60	90	
Turn-Off Delay Time	$t_{d(off)}$			11	17	
Fall Time	t_f			24	36	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 2.3\text{ }\Omega$ $I_D \cong -6.6\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		5.5	9	
Rise Time	t_r			11	20	
Turn-Off Delay Time	$t_{d(off)}$			30	45	
Fall Time	t_f			24	40	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-10	A
Pulse Diode Forward Current	I_{SM}				30	
Body Diode Voltage	V_{SD}	$I_S = -2.1\text{ A}, V_{GS} = 0\text{ V}$		-0.83	-1.2	V

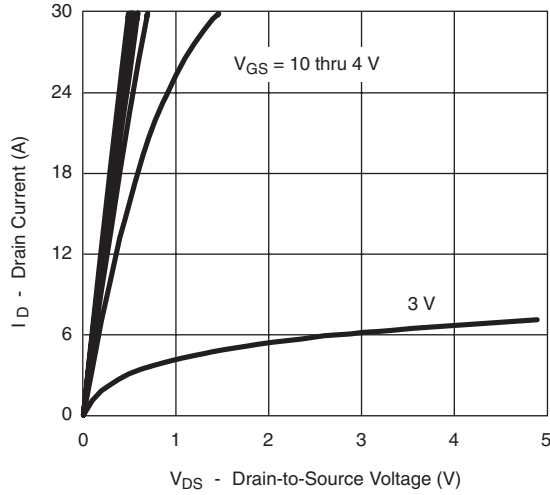
Notes:

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$
 b. Guaranteed by design, not subject to production testing.

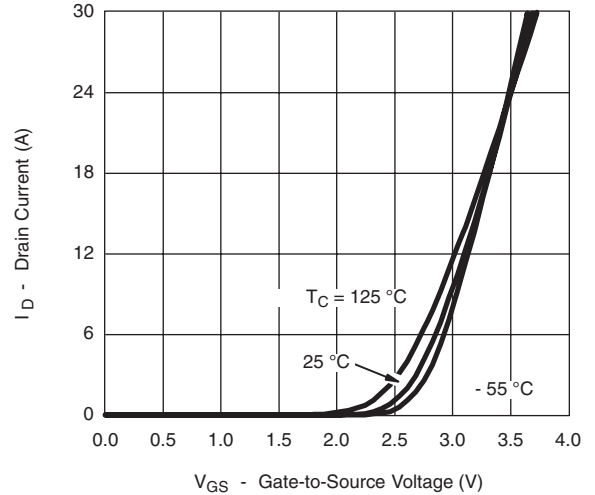
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



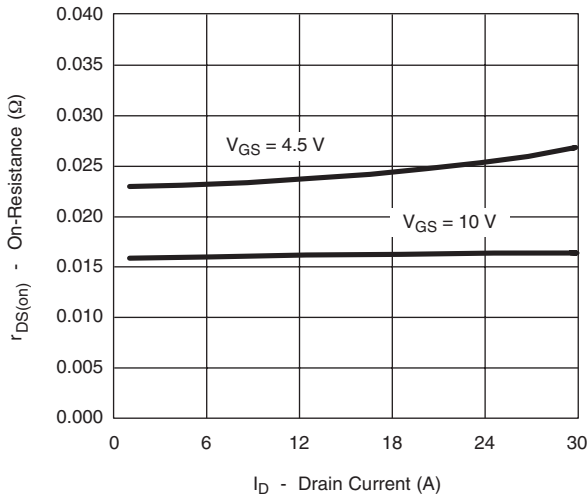
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



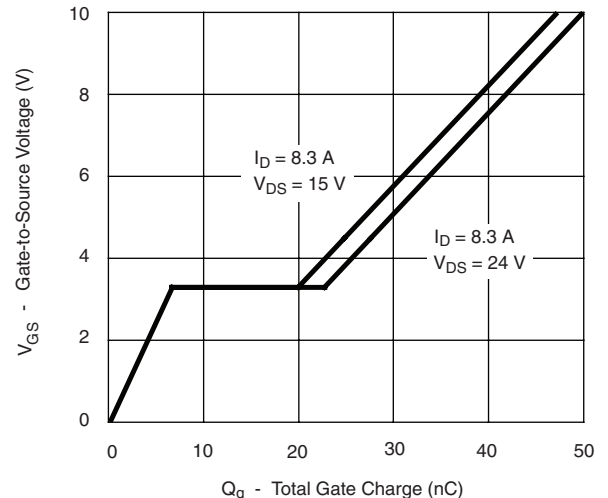
Output Characteristics



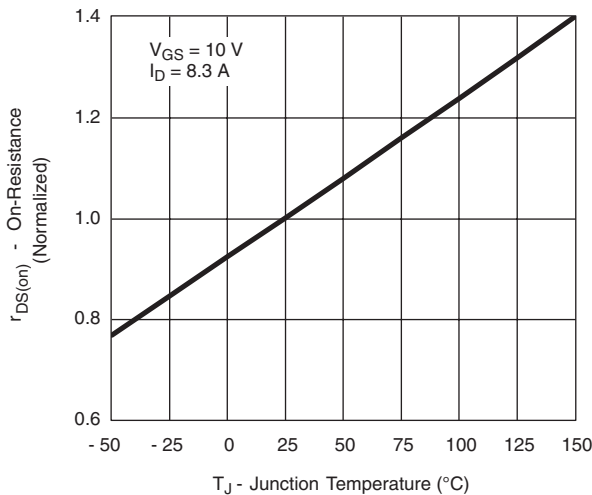
Transfer Characteristics



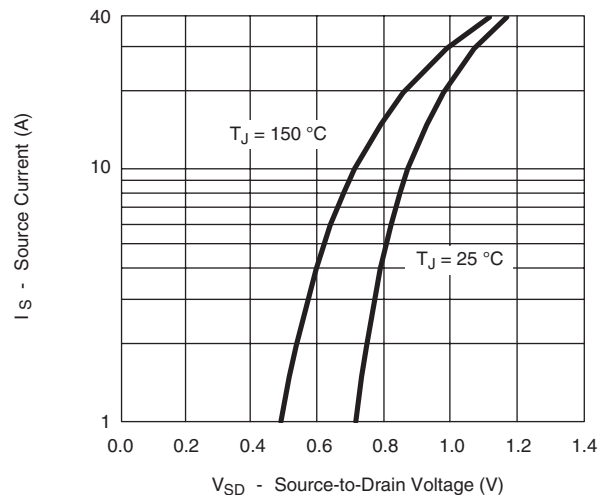
On-Resistance vs. Drain Current



Gate Charge



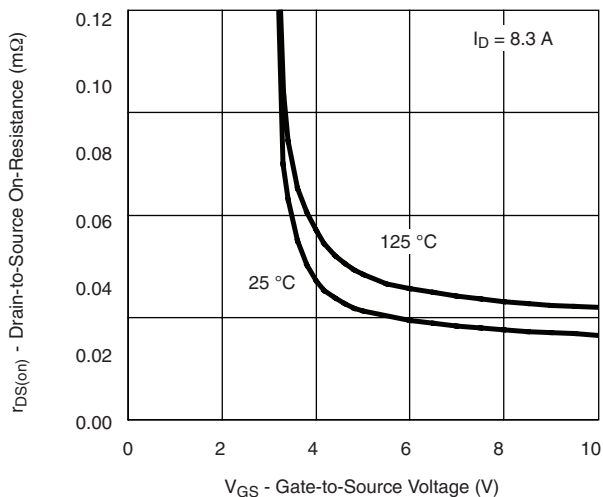
On-Resistance vs. Junction Temperature



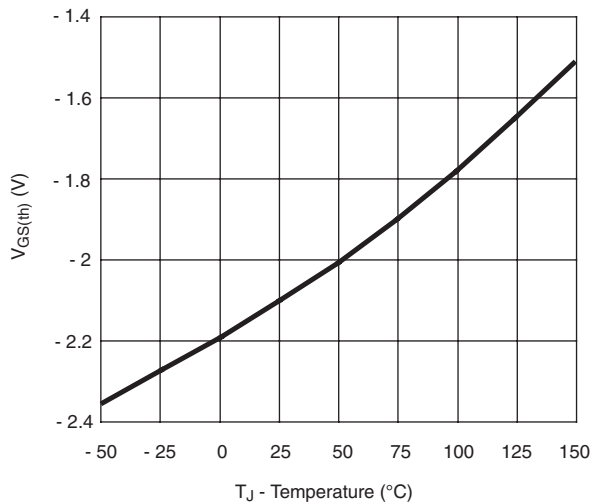
Source-Drain Diode Forward Voltage



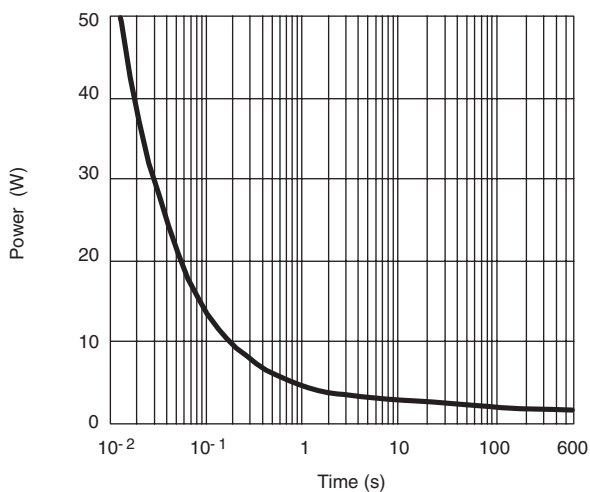
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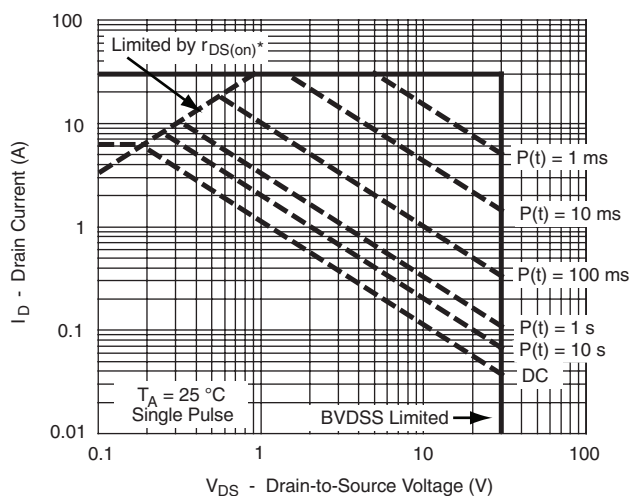
On-Resistance vs. Gate-Source Voltage



Threshold Variance



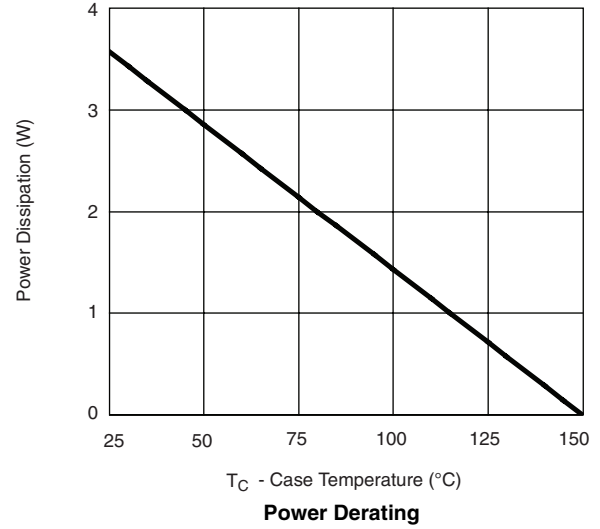
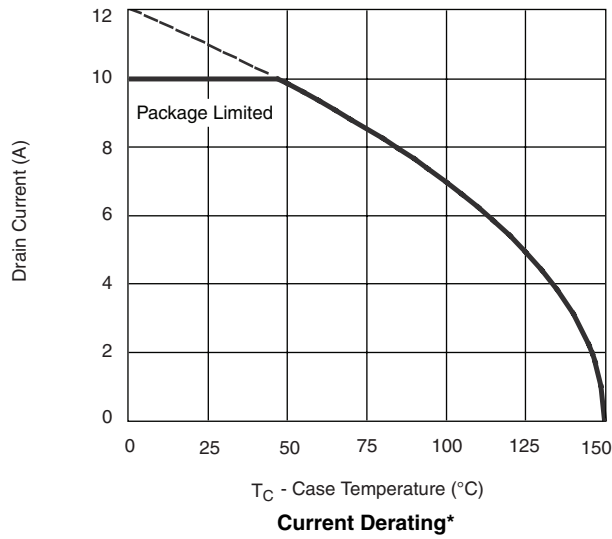
Single Pulse Power



Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified



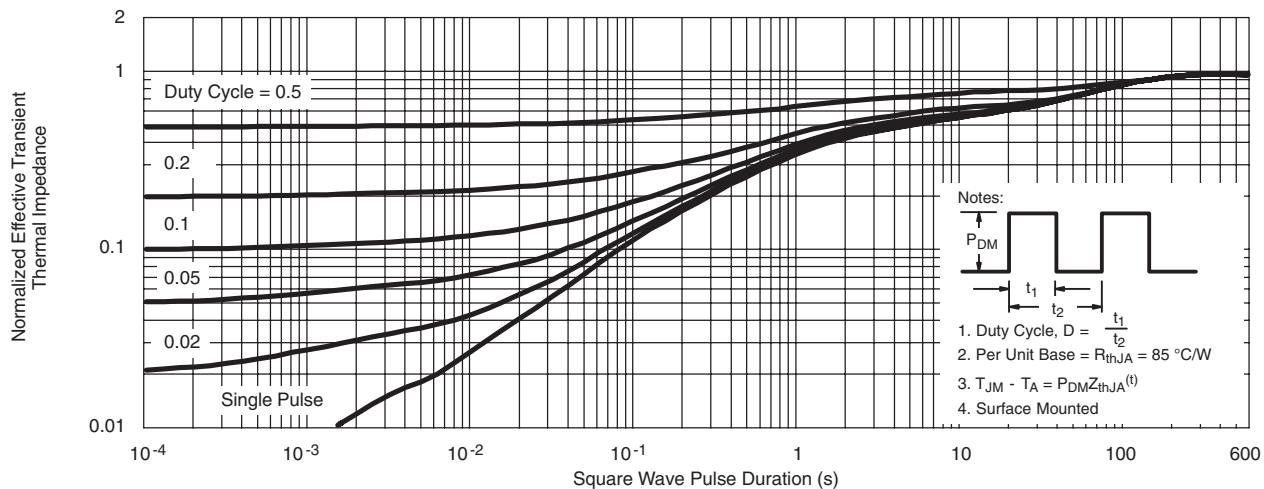
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



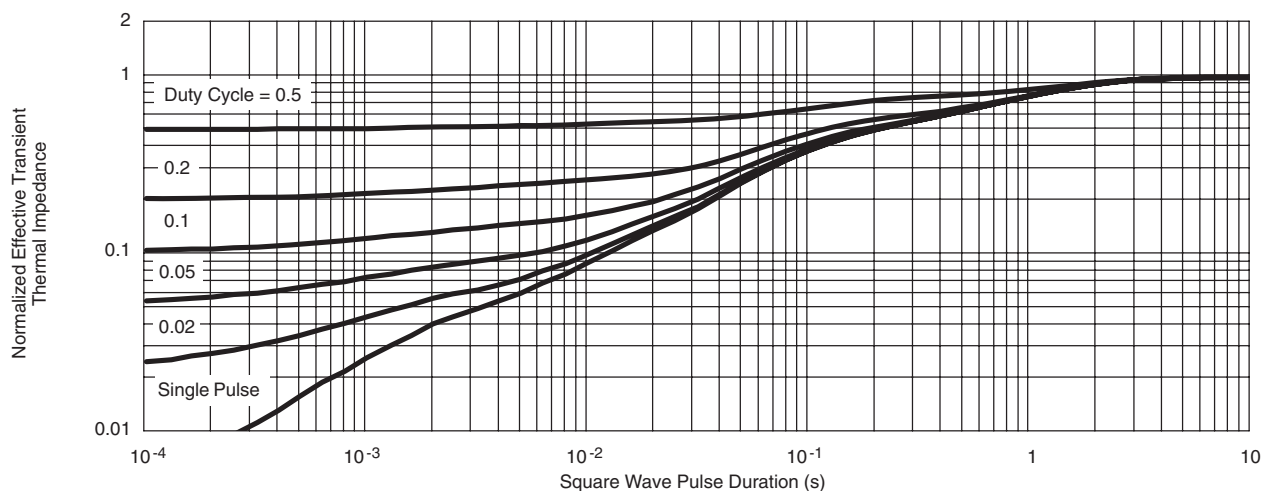
* The power dissipation P_D is based on $T_{J(max)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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